

## Claims

- [c1] A method for obtaining data, said method comprising scanning at least one of a head of a patient and a neck of the patient with a Multi-Energy Computed Tomography (MECT) system to acquire data.
- [c2] A method in accordance with Claim 1 wherein said scanning comprises scanning a head of a patient with a Multi-Energy Computed Tomography (MECT) system to acquire data allowing computation of the cerebral blood volume of the patient.
- [c3] A method in accordance with Claim 1 wherein said scanning comprises scanning a head of a patient with a Multi-Energy Computed Tomography (MECT) system to acquire data allowing computation of the cerebral blood flow of the patient.
- [c4] A method in accordance with Claim 2 wherein said scanning further comprises scanning a head of a patient with a Multi-Energy Computed Tomography (MECT) system to allow computation of the cerebral blood flow of the patient.
- [c5] A method in accordance with Claim 4 further comprising calculating a mean transit time of the cerebral blood flow based on the cerebral blood flow data and the cerebral blood volume data.
- [c6] A method in accordance with Claim 1 further comprising performing a Compton and photoelectric decomposition of the acquired data to provide an improved gray-white matter contrast in the brain.
- [c7] A method in accordance with Claim 1 further comprising performing a Basis Material Decomposition (BMD) of the acquired data to characterize a plaque in an carotid artery.
- [c8] A method in accordance with Claim 1 further comprising monitoring a CT number change in a contrast-enhanced brain study to provide improved CT number accuracy.
- [c9] A method in accordance with Claim 1 further comprising performing a Basis

Material Decomposition (BMD) of the acquired data to facilitate a reduction in image artifacts.

- [c10] A method in accordance with Claim 1 further comprising performing a Basis Material Decomposition (BMD) of the acquired data to measure a size and number of white matter lesions.
- [c11] A method in accordance with Claim 1 further comprising performing a Basis Material Decomposition (BMD) of the acquired data to measure a volume of brain atrophy in a global brain structure.
- [c12] A method in accordance with Claim 1 further comprising performing a Basis Material Decomposition (BMD) of the acquired data to measure a volume of brain atrophy in at least one brain substructure.
- [c13] A method in accordance with Claim 1 further comprising performing a Basis Material Decomposition (BMD) of the acquired data to discriminate between a Mild Cognitive Impairment condition of the patient and an Alzheimer's Disease (AD) condition of the patient.
- [c14] A method in accordance with Claim 1 wherein said scanning comprises scanning at least one of a head and a neck of a patient with a Multi-Energy Computed Tomography (MECT) system to acquire data including a location of a tagging ligand.
- [c15] A method in accordance with Claim 1 wherein said scanning comprises scanning at least one of a head and a neck of a patient with a Multi-Energy Computed Tomography (MECT) system to acquire data regarding a detection of a labeled drug.
- [c16] A method in accordance with Claim 1 wherein said scanning comprises scanning at least one of a head and a neck of a patient with a Multi-Energy Computed Tomography (MECT) system to acquire data regarding a location of a tagged ligand with an affinity to a specific labeled drug's receptors, and a detection of the specific labeled drug to simultaneously monitor the labeled drug's distribution and the drug's effect on the kinetics of the receptors.

- [c17] A method in accordance with Claim 1 wherein said scanning comprises scanning a head of a patient with a Multi-Energy Computed Tomography (MECT) system to acquire data regarding a location of a tagged ligand with an affinity to a neurotransmitter released by a specific labeled drug's receptors, and a detection of a labeled drug to simultaneously monitor the labeled drug's distribution and a concentration of the neurotransmitter.
- [c18] A method in accordance with Claim 1 wherein said scanning comprises scanning at least one of a head and a neck of a patient with a Multi-Energy Computed Tomography (MECT) system to acquire data regarding a targeting agent of a tumor.
- [c19] A method in accordance with Claim 1 wherein said scanning comprises scanning at least one of a head and a neck of a patient with a Multi-Energy Computed Tomography (MECT) system to acquire data regarding a targeting agent of a tumor wherein the targeting agent comprises a tumor-specific ligand.
- [c20] A method in accordance with Claim 1 further comprising classifying tissue as cancerous and non-cancerous based upon the acquired data.
- [c21] A method in accordance with Claim 1 wherein said scanning comprises scanning at least one of a head and a neck of a patient with a Multi-Energy Computed Tomography (MECT) system to provide an improved detection of concussion of supporting structures in the neck and fracture of the bones in the head and neck.
- [c22] A method in accordance with Claim 1 wherein said scanning comprises scanning at least one of a head and a neck of a patient with a Multi-Energy Computed Tomography (MECT) system to provide an improved detection of abnormal growth on the bones of the head and neck.
- [c23] A Multi-Energy Computed Tomography (MECT) System comprising:  
a radiation source;  
a radiation detector; and  
a computer coupled to said radiation source and said radiation detector, said

computer configured to:

receive data regarding a first energy spectrum of a scan of a head of a patient;  
receive data regarding a second energy spectrum of a scan of the head;  
generate an image of at least one of a cerebral blood volume of the patient and  
a cerebral blood flow of the patient; and  
calculate a mean transit time of the cerebral blood flow based on the received  
data.

[c24] A MECT system in accordance with Claim 21 wherein said computer further  
configured to perform a Compton and photoelectric decomposition of the  
received data to provide improved gray-white matter contrast in the brain.

[c25] A MECT system in accordance with Claim 21 wherein said computer further  
configured to perform a Basis Material Decomposition (BMD) of the received  
data to measure a volume of brain atrophy in a global brain structure.

[c26] A MECT system in accordance with Claim 21 wherein said computer further  
configured to perform a Basis Material Decomposition (BMD) of the received  
data to discriminate between a Mild Cognitive Impairment condition of the  
patient and an Alzheimer's Disease (AD) condition of the patient.

[c27] A Multi-Energy Computed Tomography (MECT) System comprising:  
a radiation source;  
a radiation detector; and  
a computer coupled to said radiation source and said radiation detector, said  
computer configured to:  
receive data regarding a first energy spectrum of a scan of at least one of a  
head of a patient and a neck of the patient;  
receive data regarding a second energy spectrum of the scan; and  
generate a location of a tagging ligand based upon the received data.

[c28] A Multi-Energy Computed Tomography (MECT) System comprising:  
a radiation source;  
a radiation detector; and  
a computer coupled to said radiation source and said radiation detector, said

computer configured to:

receive data regarding a first energy spectrum of a scan of at least one of a head of a patient and a neck of the patient;

receive data regarding a second energy spectrum of the scan; and

detect a labeled drug based upon the received data.

[c29]

A Multi-Energy Computed Tomography (MECT) System comprising:

a radiation source;

a radiation detector; and

a computer coupled to said radiation source and said radiation detector, said computer configured to:

receive data regarding a first energy spectrum of a scan of a head of a patient;

receive data regarding a second energy spectrum of the scan;

generate a location of a tagged ligand with an affinity to a neurotransmitter released by a specific labeled drug's receptors based upon the received data; and

detect a labeled drug based upon the received data to simultaneously monitor the labeled drug's distribution and a concentration of the neurotransmitter.

[c30]

A Multi-Energy Computed Tomography (MECT) System comprising:

a radiation source;

a radiation detector; and

a computer coupled to said radiation source and said radiation detector, said computer configured to:

receive data regarding a first energy spectrum of a scan of a head of a patient;

receive data regarding a second energy spectrum of the scan; and

perform a Basis Material Decomposition (BMD) of the received data to characterize a plaque in a carotid artery.

[c31]

A Multi-Energy Computed Tomography (MECT) System comprising:

a radiation source;

a radiation detector; and

a computer coupled to said radiation source and said radiation detector, said computer configured to:

receive data regarding a first energy spectrum of a scan of a head of a patient;  
receive data regarding a second energy spectrum of the scan; and  
classify tissue as cancerous and non-cancerous based upon the received data.